Claims

1. A method of controlling a data unit sender arranged to operate in accordance with a communication protocol that provides for a feedback function according to which a sender in a data unit communication receives feedback messages from a receiver that report on the receipt of data units, and having a send buffer for storing data to be sent, said method comprising:
a flow control procedure for controlling the flow of data sent by said data unit sender, said flow control procedure being arranged such that at any given moment the amount of previously unsent data that the sender can send at once is limited by an available transmission capacity value,
a procedure for detecting a time-out monitoring procedure triggering event,
a time-out monitoring procedure for monitoring whether a feedback message for a designated data unit arrives before a predetermined time-out period (S-RTO) has expired, said predetermined time-out period (S-RTO) starting at the occurrence of the time-out monitoring procedure triggering event, and for retransmitting the designated data unit if said predetermined time-out period (S-RTO) expires without said acknowledgment message having arrived,

wherein

said predetermined time-out period (S-RTO) is a first time-out period (S-RTO), and

said time-out monitoring procedure is arranged to perform a retransmission of said designated data unit upon expiration of a second time-out period (Q-RTO) shorter than said first time-out period (S-RTO), if upon

the expiration of said second time-out period (Q-RTO) said available transmission capacity value for unsent data is greater or equal to the size of said designated data unit.

2. A method according to claim 1, wherein said designated data unit is only retransmitted upon expiration of said second time-out period (Q-RTO) if the amount of unsent data in said send buffer is smaller than or equal to a threshold value.

3. A method according to one of the preceding claims, wherein said time-out monitoring procedure is furthermore arranged to perform a congestion control procedure subsequent to the expiration of said second time-out period (Q-RTO), said congestion control procedure comprising an adjustment procedure for adjusting one or more parameters used by said flow control procedure such that the amount of previously unsent data that the sender is allowed to send at once is reduced.

4. A method according to claim 3, wherein said congestion control procedure is arranged to perform said adjustment procedure upon expiration of said second time-out period (Q-RTO).

5. A method according to claim 3, wherein said congestion control procedure is arranged to delay performing said adjustment procedure, and to perform an intermediate monitoring procedure during an intermediate period between the expiration of said second time-out value (Q-RTO) and said first time-out value (S-RTO), said intermediate monitoring procedure being arranged to detect whether a feedback message relating to said designated data unit arrives within said intermediate period, and said adjustment procedure being arranged to

respond to the outcome of said intermediate monitoring procedure to perform a first adjustment of said one or more parameters if no feedback message relating to said designated data unit arrives within said intermediate period, and to perform a second adjustment of said one or more parameters if a feedback message relating to said designated data unit arrives within said intermediate period, said first adjustment being different from said second adjustment.

6. A method according to claim 5, wherein said intermediate monitoring procedure is arranged to be able to distinguish whether a received feedback message relating to said designated data unit relates to the retransmission of said designated data unit performed upon expiration of said second time-out value (Q-RTO) or to a prior transmission of said designated data unit, and said adjustment procedure being arranged to leave said one or more parameters unchanged if said received feedback message relates to a prior transmission of said designated data unit.

7. A method according to one of claims 1 to 6, wherein said flow control procedure is window based and arranged to determine said available transmission capacity value on the basis of the difference between a send window and an amount of outstanding data.

8. A method according to one of claims 1 to 6, wherein said flow control procedure is rate based and arranged to determine said available transmission capacity value on the basis of an allowable transmit rate.

9. A method according to one of the preceding claims, comprising a procedure for measuring a feedback response time (RTT), said feedback response time being indicative of the time that passes between the sending of a data

unit and the receipt of a feedback message relating to said feedback message, wherein said second time-out value (Q-RTO) is determined in dependence on one or more measured feedback response time values.

10. A method according to claim 9, wherein said first time-out value (S-RTO) is also determined in dependence on one or more measured feedback response time values.

11. A method according to one of the preceding claims, wherein said second time-out value (Q-RTO) is larger than or equal to a fraction of the first time-out value (S-RTO).

12. A method according to one of the preceding claims, wherein said data unit sender is arranged to operate in accordance with the Transmission Control Protocol TCP, and said first time-out value (S-RTO) is the standard TCP Retransmission Time-Out parameter RTO.

13. A data unit sender arranged to operate in accordance with a communication protocol that provides for a feedback function according to which a sender in a data unit communication receives feedback messages that report on the receipt of data units, comprising:

send buffer for storing data units to be sent,

a flow controller for controlling the flow of data sent by said data unit sender, said flow controller implementing a flow control procedure arranged such that at any given moment the amount of previously unsent data that the sender can send at once is limited by an available transmission capacity value,

a detector for detecting a time-out monitoring procedure triggering event,

a time-out monitor for monitoring whether a feedback message for a designated data unit arrives before a predetermined time-out period (S-RTO) has expired, said predetermined time-out period (S-RTO) starting at the occurrence of the time-out monitoring procedure triggering event, and for retransmitting the designated data unit if said predetermined time-out period (S-RTO) expires without said acknowledgment message having arrived, wherein said predetermined time-out period (S-RTO) is a first time-out period (S-RTO), and

said time-out monitor is arranged to perform a retransmission of said designated data unit upon expiration of a second time-out period (Q-RTO) shorter than said first time-out period (S-RTO), if upon the expiration of said second time-out period (Q-RTO) said available transmission capacity value for unsent data is greater or equal to the size of said designated data unit.

14. A data unit sender according to claim 13, wherein time-out monitor is arranged such that said designated data unit is only retransmitted upon expiration of said second time-out period (Q-RTO) if the amount of unsent data in said send buffer is smaller than or equal to a threshold value.

15. A data unit sender according to claim 13 or 14, wherein said time-out monitor is furthermore arranged to perform a congestion control procedure subsequent to the expiration of said second time-out period (Q-RTO), said congestion control procedure comprising an adjustment procedure for adjusting one or more parameters used by said flow control procedure such that the amount of previously unsent data that the sender is allowed to send at once is reduced.

16. A data unit sender according to claim 15, wherein said congestion control procedure is arranged to perform said adjustment procedure upon expiration of said second time-out period (Q-RTO).

17. A data unit sender according to claim 15, wherein said congestion control procedure is arranged to delay performing said adjustment procedure, and to perform an intermediate monitoring procedure during an intermediate period between the expiration of said second time-out value (Q-RTO) and said first time-out value (S-RTO), said intermediate monitoring procedure being arranged to detect whether a feedback message relating to said designated data unit arrives within said intermediate period, and said adjustment procedure being arranged to respond to the outcome of said intermediate monitoring procedure to perform a first adjustment of said one or more parameters if no feedback message relating to said designated data unit arrives within said intermediate period, and to perform a second adjustment of said one or more parameters if a feedback message relating to said designated data unit arrives within said intermediate period, said first adjustment being different from said second adjustment.

18. A data unit sender according to claim 17, wherein said intermediate monitoring procedure is arranged to be able to distinguish whether a received feedback message relating to said designated data unit relates to the retransmission of said designated data unit performed upon expiration of said second time-out value (Q-RTO) or to a prior transmission of said designated data unit, and said adjustment procedure being arranged to leave said one or more parameters unchanged if said received feedback message relates to a prior transmission of said designated data unit.

19. A data unit sender according to one of claims 13 to 18, wherein said flow control procedure is window based and arranged to determine said available transmission capacity value on the basis of the difference between a send window and an amount of outstanding data.

20. A data unit sender according to one of claims 13 to 18, wherein said flow control procedure is flow rate based and arranged to determine said available transmission capacity value on the basis of an allowable transmit rate.

21. A data unit sender according to one of claims 13 to 20, comprising an element for measuring a feedback response time (RTT), said feedback response time being indicative of the time that passes between the sending of a data unit and the receipt of a feedback message relating to said feedback message, wherein said data unit sender is arranged to determine said second time-out value (Q-RTO) in dependence on one or more measured feedback response time values.

22. A data unit sender according to claim 21, wherein said data unit sender is furthermore arranged to also determine said first time-out value (S-RTO) in dependence on one or more measured feedback response time values.

23. A data unit sender according to one of claims 13 to 22, wherein said second time-out value (Q-RTO) is larger than or equal to one half of the first time-out value (S-RTO).

24. A data unit sender according to one of claims 13 to 23, wherein said data unit sender is arranged to operate in accordance with the Transmission Control Protocol TCP,

and said first time-out value (S-RTO) is the standard TCP Retransmission Time-Out parameter RTO.

25. A computer program arranged to execute the method of one of claims 1 to 12 when executed in a data processing device connected to a communication network for operating as a data unit sender.

26. A computer readable data carrier comprising a computer program according to claim 25.